



A quest for measuring intra operative blood loss in maxillofacial surgery

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ABSTRACT

Aim: To find out a simple, standardized method to measure intra-operative blood loss during major oral surgical procedures which alerts the clinicians to manage untoward outcomes in time.

Materials & Method: Patients who underwent surgical intervention for various dentofacial deformities, maxillofacial pathologies, maxillofacial trauma under general anesthesia via an intra oral approach from Jan 2014 – Aug 2015 were included in the study. Thirty such patients belonging to the above entities were randomly categorized into 2 groups of 15 each based on the method of measuring the intra op blood loss. In Group A the blood loss was measured by Sahli's method and in Group B, the blood loss was measured by cyanomethemoglobin method. All the procedures were performed via an intra oral approach under general anesthesia.

Results: The amount of intra operative blood loss measured through Sahli's method appeared to be insensitive and not standardized. However, the one measured through Cyanomethemoglobin method was more accurate, standardized and easy to perform.

Conclusion: Cyanomethemoglobin method is an accurate, reliable, chair side, inexpensive, easy to perform, standardized technique to measure the intra operative blood loss in the recent times.

Keywords: Intraoperative blood loss; Sahli's method; Cyanomethemoglobin method.

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INTRODUCTION

Of many battles a surgeon encounters during years in practice, none is more demoralizing or critical than uncontrolled hemorrhage. It is a medical emergency, frequently encountered by surgeons during major and minor surgical procedures and when it comes to Oral and maxillofacial surgery it becomes further

more challenging into the site of procedure^[1]. Definitive data regarding surgical blood loss was unavailable until 1924. Prior to this time, surgeons had relied on physical signs such as skin color and pulse rate to indicate impending shock. The blood loss associated with Oral and maxillofacial surgery was first measured by Gores, Royer and Mann in 1955.^[2]

Although there are very few reports published which dealt with different techniques to measure intra operative blood loss, various methods have been tried to predict these. The aim of the present study is to come out with a standardized method in predicting the amount of intraoperative blood loss which can be simple, short, definitive and facilitate the clinician to manage the consequences well in time.

MATERIALS & METHOD

This study was undertaken in 30 subjects belonging to the age group 18-60 years. After obtaining ethical committee clearance and informed consent, all the subjects were randomly allocated into 2 groups of 15 each based on method of measuring the intra operative blood loss from Jan 2014 – August 2015. Group A included 15 subjects where the blood loss was measured by Sahli's method and Group B included 15 subjects where in the blood loss was measured by cy-

anomethemoglobin method. Portable suction catheter was connected and intraoperatively blood with the irrigating solutions were collected into collection jar. At the end of the procedure, 10ml of fluid was collected from the portable suction jar and was placed into the haemoglobinometer for estimation of Hb. Thereby, the amount of blood loss is calculated by comparing the concentration of Hb in the patient's whole blood pre operatively, with the concentration of Hb in fluid collected from portable suction jar multiplied by the volume of aspirated blood.

$$\text{Volume of blood lost} = \frac{\text{Hb recovered}}{\text{Hb whole blood}} \times \text{volume of aspirated blood.}$$

RESULTS

Descriptive analysis has been carried out with mean and standard deviation being compared. SPSS version 16 software has been used and comparison of categorical values was done using Standard t test to detect any statistical significant difference between the variables. The mean age of the patients was 34, 3years. Out of 30 subjects enrolled in the study, 17 were male, 13 were female. The blood loss measured by Sahlis method and cyanomethemoglobin method are shown in table 1.

Table 1: Sahlis method Cyanomethemoglobin method

Pre op(gm%)	Post op(gm%)	Pre op(gm%)
10.1	9.3	10.6
11.6	10.0	11.3
12.6	11.0	12.6
13.2	12.1	13.2
10.3	10.0	13.6
11.4	10.1	11.5
11.0	10.3	10.6
12.4	10.1	11.6
11.3	10.5	12.7
10.0	9.2	11.3
12.3	11.6	12.8
11.0	9.8	13.1
11.4	10.2	11.3
10.2	9.8	10.4
11.3	10.2	10.3

DISCUSSION

Despite the tremendous innovation in field of medical science and technology; intraoperative hemorrhage remains one of the major surgical complications encountered in day-to-day surgical practice. The morbidity and mortality associated with surgical hemorrhage are considerable and it remains a restraining factor for advanced surgical procedures^[1]. Intra operative hemorrhage may sometime cause significant complications and may even lead to alarming events. Hemorrhage associated with surgery is a common problem which requires proper management. We are aware of different methods of estimating intraoperative hemorrhage thereby addressing the need for immediate replacement of lost blood, especially in medically

compromised patients. This includes accurate determination of blood loss, establishment of effective haemostasis, and replacement of fluids when indicated^[2]. There have been many assessments made for blood loss during surgery in literature. Gatch, Little et al^[3] in 1924 were the first to report the measurement of blood loss by acid hematin method.³ Various methods have been tried, most popular have been the gravimetric, volumetric, colorimetric methods and measuring the difference between pre- and post-operative plasma volumes. An adult human has 4-7 liters of blood in his/her circulation; thus, the loss of 350-500 ml of blood might be negligible. However, when losing 30% (or more) of the blood volume, symptoms of hypovolemic shock might develop^[4]. Any new method to be introduced in estimating the intra op blood loss should be simple ,easy to perform ,save time ,expenditure and should be validated. Sahli's method which is routinely used in hospital settings has inbuilt disadvantages such as subjective to visual colour comparison, need for accurate pipetting, fading of comparator, poor sensitivity and reliability^[5]. Sahli's method, the graduated tube provided is filled up to the 20 mark with a solution of 0.1N HC1 A sample of 0.02 ml. of whole blood taken with a standardized manual pipette is added to this solution and the pipette rinsed in the solution. This is allowed to stand exactly for five minutes. The standard provided with the kit is placed by the side of the dilution tube, and distilled water is added with a dropper until the acid solution matches the standard. The Hb concentration is read off from the graduations on the tube and is given as a percentage^[6]. In order to overcome the above mentioned disadvantages, various methods have been discussed in the literature of which cyanomethemoglobin was the most accurate method. The cyanomethemoglobin recommended by the Technical Subcommittee of the International Council for Standardization in Hematology⁷ was used for the determination of blood loss. The cyanmethemoglobin method (HiCN) works on the principle of conversion of hemoglobin to cyanmethemoglobin by the addition of potassium cyanide and ferricyanide whose absorbance is measured at 540 nm in a photoelectric calorimeter against a standard solution^[8,9]. This method is highly accurate and is the most direct analysis available for total hemin or hemoglobin iron. Its disadvantage is the use of cyanide compounds, which, if handled carefully, should present little hazard. The present study compared the blood loss using Sahlis method and cyanomethemoglobin method. The amount of blood loss measured through cyanomethemoglobin method appears to be accurate. Amongst all the methods enlisted, volumetric and colorimetric methods can be considered better than the others, as volumetric method is easy to perform, cost effective, does not require any technique and is more accurate than the other methods and cyanomethemoglobin technique being the standardized one. Possible

sources of error in measurement of blood loss using the cyanomethemoglobin comparison technique are blood lost into the tissues, gastrointestinal system due to swallowing which cannot be recovered. The amount of anesthetic used during the procedures was the variable most correlated to amount of blood loss. However, this could be attributed to the necessity for using more anaesthetic to control bleeding and discomfort during the longer surgeries. Its disadvantage is the use of cyanide compounds, which, if handled carefully, should present little hazard. However, non-cyanide methods like alkaline hematin method and alkaline borate method also have advantages from safety standpoint as well as cost when compared to the standard cyanide method^[10]. Comparison of Sahli's with cyanmethemoglobin has shown that latter is more sensitive and accurate for estimation of intra operative blood loss and management of untoward complications.^[5]

CONCLUSIONS

In the last few decades, a number of studies have been carried out to apprehend the best-suited method for estimating the intraoperative blood loss during surgical procedures. However, there is only exiguous literature accounting for methods measuring blood loss during oral surgical procedures. Based on the available research it is observed that there is insufficient literature to consider one specific method as ideal over the other. In this review we conclude that cyanomethemoglobin method is simple, accurate, reliable, chair side, inexpensive, standardized, easy to perform in the recent times. However, further studies and innovations in techniques for estimating blood loss are warranted.

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